

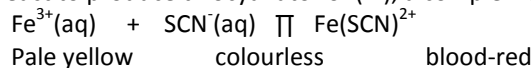
## The effect of concentration changes on equilibria

### Aim

The purpose of this experiment is to find out how a system in equilibrium responds to a change of concentration of components in the mixture.

### Introduction

Iron(III) ions and thiocyanate ions react to produce thiocyanatoiron(III), a complex ion, according to the equation:

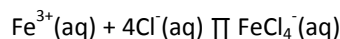


### Procedure

- Mix together one drop of 0.5 mol dm<sup>-3</sup> iron(III) chloride solution and one drop of 0.5 mol dm<sup>-3</sup> potassium thiocyanate solution in a test-tube and add about 5 cm<sup>3</sup> of distilled water to form a pale orange-brown solution.
- Divide this solution into four equal parts in four separate test-tubes.
- Add one drop of 0.5 mol dm<sup>-3</sup> iron(III) chloride to one test-tube.
- Add one drop of 0.5 mol dm<sup>-3</sup> potassium thiocyanate to one test-tube.
- Compare the colours of these solutions with the untouched samples. Record your observations.
- Add a spatula of solid ammonium chloride to a third test-tube and stir well with a glass rod. Compare the colour of this solution with the remaining tube and note down your observation.

### Interpretation

Note:- Ammonium chloride removes iron(III) ions from the equilibrium by forming complex ions such as  $\text{FeCl}_4^{-}$ . A possible reaction is:



The effect is to reduce the concentration of iron(III) ions.

Test	Does this increase or decrease the concentration of $\text{Fe}^{3+}$ or $\text{SCN}^{-}$ ?	Observation	Cause (in terms of concentration of the coloured species)	Inference (i.e. Which direction was the shift in position of eqm?)
Addition of iron(III) chloride				
Addition of potassium thiocyanate				
Addition of Ammonium chloride				

### Questions

- How would the position of equilibrium be affected by increasing the concentration of  $\text{FeSCN}^{2+}$ ?
- For each of the imposed changes show how the shift in the position of equilibrium agrees with Le Chatelier's Principle.